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Three Lectures

ON

THE CORRELATION

OF

PSYCHOLOGY AND PHYSIOLOGY.

BY

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M.DCCC.LIV.



## LECTURE I.

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GENERAL REMARKS ON THE PHYSIOLOGY OF THE BRAIN AND NERVOUS SYSTEM. THE REFLEX FUNCTION. OFFICE OF THE GREAT SYMPATHETIC. SENSATION AND THE RESPONDENT MOVEMENTS. PHYSICAL APPETITES.

FROM the remotest periods of physiological speculation, the brain and nervous system have been supposed to have some special connexion with the manifestations of conscious life. So early as the Greek civilisation, there were philosophers maintaining even the distinction between the nerves of movement and those of feeling. But although such doctrines were obscurely taught by the ancients, it has only been in modern times that they have received systematic development and a scientific form. Unzer, who wrote in the latter half of the last century, refers to the transmission of external impressions as sensations to the mind, and to the spontaneous conceptions which result in voluntary motion, and asks: "How could it be possible to explain these two classes of phenomena, if the existence of difference in the fibrils of the same nerve be not admitted?"\* Sir Charles Bell, by his experiments, gave to this notion that precision and certainty which demonstration alone can furnish.

And so with regard to the encephalon. Long before the

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\* Dr. Laycock's Translation for the Sydenham Society.

time of Gall, speculative physiologists suggested the probability of its distinct parts subserving particular mental operations. Only a few years prior to the publication of Gall's views, it was observed by Prochaska: "Since the brain, as well as the cerebellum, is composed of many parts, variously figured, it is probable that nature, which never works in vain, has destined those parts to various uses; so that the various faculties of the mind seem to require different portions of the cerebrum and the cerebellum for their production."\* It was Gall, however, who gave vividness to this idea, and a certain scientific shape. His physiology of the brain, in correlation with analytical psychology, has received a much larger share of attention and consideration than any which preceded it. Phrenology, however, as a system, has not received that confirmation from later investigations, which, at one time, was anticipated by many physiologists.

Of late years, the labours of Dr. Marshall Hall, Dr. Carpenter, the late lamented Mr. Newport, Mr. Solly, and some others, in this country, and those of Müller, Valentin, and Stilling, particularly, on the continent, have done much to advance the physiology of the brain and nerves; more especially in giving to it a greater exactness and a more demonstrable character. They have perfected it, indeed, to a degree which, a quarter of a century ago, would scarcely have been considered possible.

I will now proceed to furnish a summary of what may be deemed the existing state of our knowledge upon this subject, taking it for granted that my hearers have already a sufficiently accurate acquaintance with the descriptive anatomy of the structures in question.

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\* Dr. Laycock's Translation.

You are aware that, whilst the substance of the brain and nerves in appearance and general character has everywhere a certain similarity, there is yet an obvious divisibility of it into two distinct kinds—the grey and the white matter; a divisibility which applies alike to the encephalon, the spinal cord, and the nerves. The difference in these nervous substances is not an affair of colour only; it applies also to their intimate structure and organisation: the white matter is made up of bundles of tubular fibres, whilst the grey is composed of aggregated cells, and is often denominated the *vesicular neurine*. To collections of this vesicular substance, the term *ganglion* is very generally applied, because the knots of nervous matter which formerly were supposed to give origin to the nerves, and which are distributed so largely throughout the body, are vesicular in their composition. And thus the identity in structural constitution has led to employment of the word ganglion as a common term. But the ganglionic or spheroidal form is not at all essential, as was at one time supposed, to the constitution of what is now called ganglionic substance.

Physiological and pathological researches have rendered it more than probable, that the vesicular and the fibrous substances have, universally, separate and distinct offices in the animal economy. Gall, noticing the extraordinary vascularity of the grey tissue, taught that it was the first formed, and that it constituted at once the producer and the *matrix*, as he called it, of the white substance; a fact which he enunciated as general, in regard both to the brain and nerves. This theory, however, retains no hold upon physiologists of the present day, who simply maintain that the ganglionic structures are the source of *functional change*, and that the fibrous matter is for the *conduction* of impressions originating in the former. In the promulgation

of this theory, Mr. Solly shares probably in the most eminent degree.\*

In studying the vital characteristics of man and animals, aided by the lights of anatomy and physiology, we judge of their sensibility and psychical endowment by watching the phenomena which exhibit themselves in movement and other expressions of activity and consciousness; and, in deducing conclusions concerning the springs and the quality of particular actions and conduct, we look very properly to the analogies gained in the introspection of ourselves. Thus premising, I will pursue the several processes which take place through the instrumentality of the brain and nervous system, discussing, in the present lecture, the simpler manifestations of nervous function, and, in the two succeeding ones, proceeding with the more elevated displays of psychical capability.

Although not actually demonstrated, it is yet a very rational hypothesis, based upon the clearest analogy, that, distributed largely and very minutely along the whole cutaneous and mucous surfaces, there is vesicular neurine, forming the peripheral expansion of nervous filaments, which may be likened to the structure of the retina as it expands itself behind the vitreous humour. When an irritant impression is made upon the surfaces thus supposed to be supplied, a respondent movement ensues, unless the controlling and restraining influence of the will, or some other qualifying circumstance, prevent it; and this movement does not necessarily involve any consciousness whatever. The impression wrought upon the superficial nervous substance is conveyed by fibrous filaments to the vesicular neurine within the spinal cord, in which a vital change

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\* See his work on the Brain.

occurs—an influence which expands itself in an outward direction, and, through other filaments, induces muscular contraction.

It is a received doctrine that the grey matter, continuous throughout the whole length of the spinal cord, forms the analogue of the ventral ganglia, separate in the *articulata*. If one of these latter, the centipede for example, be divided into several parts, each segment will move upon the application of an outward stimulus. Amongst vertebrated creatures, in which a coalescence of ganglia in the spine has place, frogs exhibit such movements very strikingly. If the skin below the head be irritated, after detachment of the encephalon from the spinal cord, motion, the same in its outward character as that which ordinarily follows upon sensation, will ensue. The unconscious nature of this phenomenon becomes still more obvious, when that portion of the cord which is immediately above the origin of the crural nerves is divided; irritate the hind legs under such circumstances, and they are seen to retract in the most lively manner. Corresponding phenomena may be observed in the higher classes of animals, after decapitation. Even in man, certain pathological states, which involve some breach of continuity between the brain and spinal cord, will show the same thing—involuntary movement respondent to an impression of which there is no sensational consciousness.

Movements taking place under the circumstances described, have been denominated *reflex*, *excito-motory*, and *automatic*. None of these expressions constitute very exact definitions; provided, however, the function designated be rightly appreciated, the particular term employed is not of so much consequence.

The purpose of the spinal axis and its reflex function

would appear to be the conservation of the organism, through execution of the respiratory acts, by its governance of the various offices of ingress and egress, and by its contribution to the integrity of some other processes in which reflex movements participate.

I must here make a few remarks upon the ganglia of the so-called sympathetic system of nerves. These ganglia are scattered largely throughout the body; in front of the vertebral column they form two distinct and regular chains, the whole being connected by nervous filaments extended in all directions, and especially accompanying the blood-vessels. The precise function of this portion of the nervous system is somewhat obscure. Consciousness can hardly be supposed to have place in its exercise. It most likely communicates a susceptibility to certain motions involved in the processes of circulation, nutrition, and secretion; an influence not needed for their simple accomplishment, but required in the animal economy, in order that they may become related with, and in a measure subordinated to, the higher operations of the brain and nervous system.

That the functions purely organic are, in some way or another, under the influence of the nervous system, in man and the higher classes of animals, is undoubted; and that this influence operates immediately through the sympathetic system, is inferred from the following amongst other circumstances.

The anatomical distribution of this system affords to such an estimate of its functions, antecedent probability; but numerous facts exist, which give to this view a much higher character than that of mere hypothesis. Dr. Axmann, of Berlin, some years ago, instituted experiments upon frogs, with the intention of elucidating this department of physiology. Upon dividing the cranial nerves, at their origin



between the spinal cord and spinal ganglion, he found that paralysis of motion and sensation ensued, without sensible prejudice to the purely organic processes. On the division, however, being made between the ganglion and the communicating branch of the sympathetic, there resulted, in addition, pallor of the skin, partial desquamation of the epidermis, softening and friability of the tissues, minute extravasations of blood, and œdema. Upon these experiments, Romberg has the subjoined remarks. "If the sciatic nerve is divided below the part at which the fibres of the communicating branch, or, in other words, sympathetic elements, are introduced into it, we find disturbances in the circulation, which are distinctly manifested in the web of the foot. The circulation is rendered indolent and irregular; the dilated vessels are overcharged with blood-corpuscles, and in a few vessels the blood is arrested."\*

It is known that certain drugs act upon particular divisions of the nervous system, by a sort of elective affinity. And it is observed that some poisonous substances exert their primary influence upon the respiratory movements, which are mainly under the control of the excito-motory system; and again, that others, in the first instance, arrest the heart's action, presumably from injury done to the sympathetic. "Poisoning with tobacco and arsenic," says Romberg, "paralyses the cardiac nerves and arrests the circulation, while the respiratory movements continue . . . . On the other hand, the West Indian arrow poison paralyses the respiratory and voluntary movements, at the same time that the action of the heart continues, and may be kept up by artificial respiration."†

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\* Nervous Diseases of Man. Dr. Sieveking's Translation for the Sydenham Society.

† Op. citat.

Disorder of the organic functions sometimes takes place in but one of the symmetrical halves of the body, as if from some corresponding perversion of nervous agency. Sir Henry Holland has related cases in which copious perspiration was limited in this way.\*

Altogether, the evidence favouring the theory which assigns to the sympathetic nervous system a controlling influence over the processes of circulation, nutrition, and secretion, is, from its cumulative character, exceedingly strong, although it may not amount to actual demonstration.

The primary and more simple forms of *consciousness* arise through the instrumentality of the nerves and ganglia of the senses, which constitute the media through which impressions are obtained of the qualities of external objects. Although, under some circumstances, the senses may be excited from internal conditions, sensation ordinarily and naturally developes, in the percipient, a consciousness of *outness* in the excitant. The five *external* senses, as in consequence they are called, reveal the physical qualities of objects, their odour, savour, sound, colour, and density. And the functions of smell, taste, hearing, sight, and touch, are exercised, respectively, through organisation very similar to that of the functions already described. Vesicular neurine--presumptively, when not demonstrable—exists at the peripheral extremity, in a state of expansion; and again at the central termination of the nervous fibres, as ganglion.

Vesicular neurine distributed upon the lining membrane of the nostrils possesses a specific sensibility to odorous matters; the impression which these make is conveyed by

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\* Chapters on Mental Physiology.

conducting fibrous filaments to the *bulbi olfactorii*, the ganglionic centres wherein the sense of *smell* is exercised.

The vesicular expansion of nervous filaments upon the lingual surface and the palate are specifically impressed by sapid particles; and the impression, being passed along fibrous filaments to the proper ganglionic centres, induces the consciousness of *taste*. There is some uncertainty concerning the nervous apparatus of this sense, in great measure owing to the mixture of filaments from different nervous trunks on the gustatory surfaces. The special character of taste as a sense, however, and the distinctness of its nervous filaments and central ganglia, can hardly be doubted. Twenty years ago, paralytic cases came beneath my own notice, and were published at the time in the *London Medical Gazette*, showing the abolition of tactile with persistence of gustatory sensibility, and *vice versa*.

Vesicular neurine, spread largely within the internal ear, receives the vibratory undulations constituting the external cause of sound; the fibrous filaments of the auditory nerve conduct the influence to certain grey nuclei in the posterior pyramids of the medulla oblongata, that form the ganglia of *hearing*.

The retina is largely composed of vesicular neurine; visual impressions are carried along the course of the optic nerves, and attain the corpora quadrigemina, which there is every reason for concluding to be the ganglia of *sight*.

The four modes of consciousness just recounted, being accomplished by distinct nerves, and by organic apparatuses limited to particular regions of the body, have been denominated the *special senses*.

But there is developed a sense-consciousness not limited to any particular organ, but which refers itself more or less to the whole frame—common sensation. This sense resides

principally in the skin; it is particularly acute at the mucous orifices; it exists, however, in the interior structures, but in a condition less intense. It is best illustrated by the simple notion of *resistance*. Its modifications comprise the several impressions essential to ideas of the hard, the soft, the rough, the smooth, the hot, the cold, the moist, the dry, and so on. It is, moreover, through this sensibility that we appreciate the state of the muscles—obtain the *muscular sense*.

This fifth sense also is, presumably, awakened through the vesicular extremities—the peripheral expansion of fibrous filaments. Whether the grey substance and white fibres originating and conducting common sensation be the same as those which subserve the spinal reflex function, is a question yet undecided. This much, however, may be admitted: the communicated impression ascends along the posterior columns of the spinal cord, and attains grey vesicular centres—the ganglia of common sensation.

Physiologists are not agreed as to the identity of these structures; they must be expected, however, like the other sensory ganglia, to be somewhere at the base of the cranium; and I am myself disposed to think that the vesicular nuclei within the lateral lobes of the cerebellum constitute the encephalic centres of common sensation. Many years ago, Foville assigned this function to the aggregate cerebellum; and others, with great plausibility, have advocated the same notion. The anatomical connexion which exists between the ganglionic structures in question and the posterior columns of the spinal cord, through the corpora restiformia, favours the idea which I have advanced; and there are various physiological and pathological facts which go to corroborate it.

The experiments of Magendie and Longet show that the

slightest touch of the fibres of the restiform bodies induces violent pain.\* Hutin relates a case in which the sense of touch was so exalted that, upon the least contact, intolerable pain and restlessness ensued, with corresponding muscular contractions, resembling those produced by an electric discharge. The patient ultimately died in the most

rific convulsions, prostrate and exhausted. On examination after death, there was found, amongst other changes, atrophy of the cerebellum. "Its medullary centre, as compared with that of another subject, was a third less in size in either hemisphere. The white substance, which, in the normal condition, occupies the centre of the corpus rhomboidale, had ceased to exist; so that the fimbriated margins of this portion approached the centre, and only formed a small pyriform, very hard, greyish brown body."†

The view just advanced would seem to reconcile, in some degree, the doctrine of Gall with that of Flourens. The former, as all are aware, taught that the entire cerebellum forms the organ of the sexual instinct; and the latter (supported in his conclusion by most modern physiologists) conceives his experiments to have established that its office is to co-ordinate muscles acting in combination at the mandate of volition. It has also been thought to exercise some special influence in balancing the body. Now, if some portion of the cerebellum subserve ordinary feeling—common sensation, its connexion with the function imputed to it by Gall is sufficiently intelligible, without adoption of the phrenological doctrine. Numerous facts certainly appear to indicate some relation between the cerebellum and the organs of generation; but such facts receive an inter-

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\* Romberg. *Op. citat.*

† *Op. citat.*

pretation just as rational by reference to the tactile sensibility of these latter, as by unqualified admission of the phrenological idea. In the view regarding the muscular office of the cerebellum, the facts bearing upon it may receive an explanation by considering the probable influence of its peripheral vesicular neurine—its cortical grey matter—in determining to the muscles some reaction respondent to their feeling. The experiments of Budge and Valentin demonstrate an apparent influence of the cerebellum, when irritated in its cortical portion, upon the testes and vasa deferentia, in occasioning their retraction.\*

If, indeed, the idea be ultimately confirmed, which assigns to the structure in question the co-ordination of muscles in voluntary movement, it perfectly comports with my own hypothesis concerning the ganglia of common sensation; for, as Dr. Carpenter remarks, “all voluntary movements require the *guidance of sensations*; and most of these are of the tactile kind.”†

Let the whole case, however, be as it may, common sensation must have its proper ganglia somewhere; and it cannot be doubted that these, through the spinal cord, are in some sort of connexion with every sentient structure.

I would beg my hearers to understand that, with respect to any hypothesis advanced in these lectures, the individual facts cited in its support are not offered as *proof*, but simply as exemplifying the *kind of evidence* which, by accumulation, might adequately substantiate the same.

All the sensory ganglia, it may here be noticed, besides their instrumentality in inducing the simpler modes of

\* Op. citat.

† British and Foreign Med. Rev., vol. xxii, p. 510.



consciousness, produce reactions very often in the muscular system, when, through afferent nerves, they are stimulated from without; and that, too, in frequent independence of thought or volition. It would seem that impressions received in some particular ganglionic structure may be diffused through a whole chain of connected ganglia, and so bring about respondent movements of very varied character. These Dr. Carpenter designates *consensual*, not in the meaning of consentaneousness, but as occurring *with*, in dependence upon, *sense*. A young infant, long before distinct thought can have been awakened, exhibits restlessness from contiguity to its mother's bosom, provoked, it is probable, by the odour of the mammary fluid. An odious taste simply may determine the involuntary act of vomiting; a loud and unexpected sound will occasion slight but very general contraction of the muscles, as in startling; the eye, when dazzled, is rapidly withdrawn from the light; and a sudden dash of cold water provokes deep inspiration and audible sobbing. These muscular actions are *reflex*, as to their modes of occurrence; but they differ from the reflex actions purely spinal in being essentially attended with consciousness; and they differ from ordinary movements in the circumstance that neither volition, nor ideas, nor mental emotion, properly speaking, are concerned in their production.

There are other sensibilities which are external in their related objects, but which do not form the medium of information concerning the world without, and so, on this account, do not come within any of the foregoing categories. These comprise the physical appetites of *hunger* and *thirst*. Nothing is made out with respect to the ganglionic centres of these affections. Probably they somewhere exist among the tracts of grey matter at the base of the encephalon.

phalon, there being much vesicular neurine there, the function of which is quite uncertain. But, upon this subject, conjecture on the basis of analogy alone exists at present.

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## LECTURE II.

## ON EMOTIONAL SENSIBILITY, AND ITS REACTIONS.

THERE is a sensibility more elevated in the psychical scale than either external sensation or the physical appetites; I refer to that all-pervading sense of bodily existence which the German psychologists have named *Cænesthesis*—general feeling, and sometimes self-feeling (*Selbst-gefühl*). This sensibility connects itself, apparently, with the peripheral termination of nerves throughout the whole body, but more particularly of those supplying the thoracic and abdominal viscera.

It would seem to localise itself in an especial manner about the præcordial region. It will best be indicated psychologically, by use of the popular phraseology, *the spirits*. Under ordinary circumstances, this sense-consciousness is that of bodily contentment—tranquil spirits. When it is exalted, we are said to be in high spirits, glad at heart, joyous; we feel as if there were a spring in every limb; we are light as a feather. When it is depressed, low spirits are experienced; we are heavy and dull, and inapt for exertion. Acutely felt, it is *emotion*. These several states of the animal spirits, so designated, may result from purely physical causes, and, in their origin, be quite irrespective of thought. All persons have their general sensibility more or less modified by atmospheric states and by conditions of

the viscera. Refer to the recollections of some brilliant morning in early summer; how cheering the experience. Go back in memory to the gloomy days of a damp November, and recal the dispiriting influence of its fogs and its mists. The relation between visceral states and the animal spirits is the theme of perpetual recognition. Who has not experienced the importance of a sound digestion to the tranquillity of his feelings?

This general sensibility has sometimes been confounded with common sensation. A moment's reflection, however, upon the respective phenomena should demonstrate their essential difference. Emotional sensibility maintains no sort of uniformity with that which is tactile. On the contrary, when the former is greatly elevated, the sense of touch is sometimes paralysed. Witness the emotional effects observed in heroic enthusiasm, and how merely sensational impressions are disregarded under such circumstances. And the tactile sensibility may be most acute, when there is no emotional excitement whatever. When this latter has place to a great extent, a mitigation is often obtained by superinducing the ordinary sense of bodily pain. In that extraordinary epidemic of the middle ages, the dancing mania, so admirably described by Hecker, the paroxysms were most effectually interrupted by blows and kicks, which persons were always found ready to administer; the operation of these being to bring about sensational, and thereby to weaken emotional, sensibility. During the periods of excitement, the external senses were literally sealed. "While dancing," says Hecker, "they neither saw nor heard, being insensible to external impressions through the senses."

The action of particular medicines suggests a physiological distinction between sensation and emotion. Opium and

other such drugs, whilst they depress tactile sensibility, exalt that which is emotional.

Now for the *cœuæsthesis*, or self-feeling, or the emotive sense, as it has been variously designated, there must, I apprehend, be proper ganglia within the encephalon. Dr. Carpenter is with those who refer this function to the same centres as those of the external senses, and particularly to the gangliotic centres of common sensation. He entertains the opinion, with some other physiologists, that the posterior cerebral ganglia, commonly called the optic thalami, are for the fulfilment of this latter office; and that the anterior ganglia, the corpora striata, are most likely the source of the respondent movements. I have myself proposed, in the last lecture, that the inferior ganglia of the cerebellum constitute the encephalic centres of common sensation; and I believe that the optic thalami and corpora striata—the corresponding ganglia of the cerebrum—form the special region of emotional sensibility.

Comparative anatomy would seem, in some measure, to favour this opinion. In the lower forms of vertebrated creatures, the analogues of the corpora striata and optic thalami are exceedingly large in relation to the rest of the encephalon. In fishes, these structures are voluminous, whilst cerebral hemispheres, in some instances, are not discoverable, and, in many others, are purely rudimentary; and, so far as we can reason concerning the psychology of fishes, we should infer that some inward sensibility, rather than external sensation, principally determined their numerous movements, these being subservient to their self-conservation, and having but little relation, apparently, to outward phenomena. In this view of the case, we should deem their chief sensibility to be emotional in its nature, rather than tactile; but, of course, not to the exclusion of this latter,

though in the watery element there would appear to be no predominant need for it.

The encephalon of birds does not show quite so predominant a size of the ganglia under consideration, the cerebral hemispheres being more developed; it seems reasonable, however, to refer the instinctive and habitual movements of birds in a great degree to sensibility of an emotional character.

When we come to the mammalia, and the higher we ascend in the scale, the entire conscious life of the different creatures becomes less and less a mere sensibility, and more and more an intelligence. And when we arrive at Man, the highest forms of this latter are attained; and emotion, as an independent and primary source of movement and conduct, sinks to its lowest point, abundant though it remain.

These circumstances correspond with the relation, as to volume, which the hemispheres of the brain and the cerebral ganglia—optic thalami and corpora striata—maintain towards each other, throughout the animal kingdom. The lower we descend in the scale, the more do these latter structures go to make up the encephalon; and, in the same correspondence, the more do the actions appear to spring from some instinctive, unintelligent source—the emotive principle of “self-feeling”, most likely.

Vivisections practised upon the nervous centres are of no great value in determining function, excepting in so far as they corroborate an inference otherwise obtained. It was found by Dr. Budge that irritation of the corpora striata and corpora quadrigemina—these latter being immediately contiguous to the optic thalami—excited vivid peristaltic movements.\* A like effect is a very ordinary result of sudden and intense emotion.

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\* London Medical Gazette, vol. i, for 1839-40.

The evidences, also, of morbid anatomy, in inquiries of this nature, are but little conclusive. Andral's collection of instances in which there was found extravasation into the optic thalami, do not, however, exhibit any corresponding lesion of tactile sensibility, a result which might have been anticipated, with unusual frequency at least, if the structures had been the ganglia of common sensation. Perversions of the emotive sense, as distinguishable from external sensation, have had too little account taken of them, for the existing records of morbid anatomy to be made available with reference to the hypothesis I have myself advanced.

In the autumn of last year, I assisted at the *post mortem* examination of a case, in which, during life, there had been unusual manifestation of emotional sensibility, without disturbance of the intellect. The right corpus striatum alone afforded signs of morbid change. Notes were taken at the time by my friend, Mr. Walsh, of this city, who had attended the patient; and from these I cite the following account. James Connor, aged 56, was a man of temperate habits, and one who, through life, had enjoyed good health and spirits, until within two years of his death. At this period, he became involved in pecuniary difficulties, and hereupon became low-spirited and somewhat unsocial. He continued to follow his business, however, as usual. Two months before his death, he embarked the remains of a small capital in some speculative undertaking, which issued in complete and immediate failure; a circumstance which very seriously aggravated his mental depression. A fortnight after this catastrophe, he was seized with slight paralysis of one arm, which, however, disappeared spontaneously in about a week. It returned in a few days with increased severity, hemiplegia, indeed, shewing itself. The affection, to some extent, involved both sensation and

motion; and there was also, inability to articulate with any distinctness. "At this time," says Mr. Walsh, "I was sent for. I found his general health not bad. Though both motion and sensation were affected considerably, neither was abolished; the tongue appeared to be the most affected, especially when efforts were made to converse. There was some impairment of vision, but the pupil showed no change. His intelligence was undisturbed, and but little enfeebled. *His emotional excitability was remarkable, the most trifling circumstance being sufficient to provoke it. When I visited him, he was literally overjoyed; and, when I took my leave, he would grasp my hand and burst into tears.* At my last visit, twenty-six hours before his death, there was but little change in his general condition, except that he was weaker; still he was able to be up and out of bed. When I left him on this occasion, the emotion displayed was truly distressing. He rested badly the ensuing night, moaning much at intervals; next morning he became drowsy, and towards noon was slightly convulsed. He expired at 6 P.M., Nov. 18th, 1853. On examining the head, eighteen hours after death, the vessels of the scalp were empty; the sub-cutaneous tissue was pallid; the membranes of the brain were healthy, the vessels unloaded, and the sinuses empty; the superior aspect of the cerebrum was natural, the convolutions a little flattened probably. On raising up the whole encephalon, a considerable quantity of serum slightly tinged with blood was found at the base. The consistence of the cerebral substance was good, and on slicing it very few *puncta vasculosa* were observable. Fluid, similar to that discovered at the base, occupied the ventricles also, and in considerable quantity. The choroid plexuses were not congested; but, *over the right corpus striatum, there ramified several large vessels. On cutting into this structure, the grey colour was*



*found deepened, and blood flowed from a number of points, forming in these respects a striking contrast to its fellow on the opposite side, as indeed to all the rest of the encephalon. The cerebellum was quite natural."*

The following communication with which I have been kindly favoured by Dr. Fripp, of London, comprises particulars of a case very analogous to the one just related :—  
 "A gentleman intimately known to me, one who possessed considerably more than ordinary powers of mind and attainments, and one whose strength of purpose and firmness were among his most distinguishing characteristics, was seized, without previous warning, with forgetfulness of words, in the midst of a very active career involving ceaseless occupation of mind and body. Perfect quietude and gentle medication very speedily succeeded in restoring this failure, and he appeared well again. But it was impossible to restrain his ardent desire for activity by the most explicit announcement of what this symptom in all probability indicated. In about two months, sudden and complete confusion of memory occurred, producing the strangest jumbling together of true and false that I remember ever to have witnessed. This was followed by partial paralysis of the left arm and facial muscles: and, at the same time, *great emotional excitability shewed itse'f*. It is worthy of remark that apart from the affection of memory of recent events—which itself underwent considerable improvement—there was no impairment of intellect to be recognised. His conversation upon abstract topics and on whatever appealed chiefly to the reasoning powers was as clear and forcible as ever: and his quiet indomitableness of will shewed itself repeatedly in many characteristic ways. Yet he was at this very time, and whilst the memory was improving, *moved to tears—a thing quite strange to him—by the slightest occasion of feeling, even by a kind*

*word, and the sight of a friend.* After some considerable apparent amendment, and on account of reapplication to various objects of former interest and occupation, which it surprises me now to think of as possible in such a condition, he suddenly became apoplectic, and died within ten months of the very first intimation of disease.

"Besides evidence of some meningo-cephalitis on the surface chiefly on the right side, the main result of the *post mortem* inspection was the disclosure of a large mass of dirty grey softened cerebral substance in the central part of the right hemisphere on a level with the corpus callosum, and principally over the posterior part of the corpus striatum. *This portion of the corpus striatum was itself softened, and as though corroded,* and liquefied matter filled the descending corner of the corresponding lateral ventricle. The thalamus was sound; as also every other part of the encephalon appeared to be, after a most searching examination.

"What struck me as a point of connexion between this case and your views of the function of different parts of the encephalon, was, I need hardly say, the prominent development during its progress of emotional excitability, and the damaged corpus striatum, with perfect integrity of the meso-cephale, apparent after death. But to enable you to judge more fairly how far this connexion deserves to be regarded as essential, I have briefly stated all the other leading particulars of the case."

Certain nations are characterised more than others by emotional sensibility; the Irish, for example, more than the Scotch. Women are, in this respect, more remarkable than men. It would be interesting to compare the relative development of the optic thalami and corpora striata in the respective instances.

Emotional sensibility produces its own reactions upon the



muscular system, independently of the movements denominated consensual. A cheerful countenance, with a light elastic step, denotes a pleasurable feeling; whilst a sorrowful, anxious look, with heavy tread and measured gait, indicates painful and depressed emotion.

In certain morbid states, emotional sensibility will react upon muscles that are paralysed to volition and sensory impressions. In laughter and weeping, facial paralysis becomes disguised, sometimes, for the moment.

Probably the most striking and conspicuous phenomenon, consensual as ordinarily occurring, is formed by the *ejaculatio seminis*. But I had, some years ago, a patient—a gentleman in good general health, and in the meridian of life—in whom there was impotence of erection and insensibility to the allied local impression; yet, under the influence of emotion—in attempted *coitus*—the seminal effusion would take place.

Such facts, I conceive, corroborate the view which I have taken, that sensation and emotion have separate and distinct centres in the encephalon.

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## LECTURE III.

## ON IDEAS, AND THEIR DYNAMIC INFLUENCE.

A FORM of consciousness which is higher still in the psychological scale than either sensation or emotion—THOUGHT—exists also in the present sphere of existence, dependent upon organisation. Impressions received through the sensory and emotive ganglia influence thinking, and, in some sense, are essential to it; but thought itself is something beyond. These impressions constitute the material of *ideas*—those mental perceptions of objects and states of existence which form the basis of all positive knowledge, and which, once realised in the consciousness, can be recalled in memory, and thus be rendered available in the higher operations of mind.

It is physiologically certain that the *intelligence*, alike in the apprehension of things, qualities, and circumstances, and in the combination and arrangement of ideas, has cerebral instrumentality for its exercise; and evidence from all sources, anatomical, physiological, and pathological, points to the cortical grey matter of the brain, the vesicular neurine investing the convolutions, as supplying the requisite organic conditions. Mr. Solly has very appropriately designated this structure the *hemispherical ganglia*.

The progress of an impression from sensation, through intuition and representation, up to thought, has supplied to

psychologists the occasion of much interesting speculation ; but, in physiology, we need not attempt any such detailed analysis. An anatomical distinction, however, between the region of thought and that of sensibility can very fairly be established ; and a certain aptitude, moreover, can be recognised in the encephalic structure for conveying the impressions of sense upwards to the hemispherical ganglia. White matter intervenes between the vesicular neurine of the sensory ganglia and that of the cerebral convolutions ; the conscious impressions received by the former may be regarded as ascending along the white fibres, and, on the grey summit being attained, developing changes in its condition which minister to the intelligence. Ideas arise. If we reflect upon the processes that go on within our own minds, there is no difficulty in distinguishing between a sensation and an idea, or in marking the sequential origin of the latter. How often do we find that, when the full consciousness of sensation is obtained, the idea suggested by it does not follow until many seconds, or even minutes, afterwards. For example, you hear the utterance of certain words, as sounds ; their signification does not strike you ; no effort of attention is made ; yet suddenly the sense breaks upon your intelligence. The correlated physiological phenomena may thus be stated. The auditory ganglia take up the sentient impression at once ; its passage onwards to the seat of thought is delayed : presently, however, its natural course is freed, as if from some hindrance ; and it attains the hemispherical ganglia, forming or awakening ideas in the mind.

Cranioseopic facts of a very obvious character render it probable that the anterior portion of these ganglia subserves, in an especial manner, the intellectual operations ; that the upper region is associated very much with thoughts that

are allied with the higher sentiments; and that the posterior division is connected mainly with ideas that refer themselves to the inferior affections and propensities of our nature. The doctrine of separate organs, however, for particular faculties of the mind, can hardly, in the present state of knowledge, be regarded as scientific truth.

The changes which, as sensations, are accomplished in the encephalon, develop ideas; and these latter exert back again upon the organism a dynamic influence which has afforded to physiologists abundant material for curious and ingenious theories. The various bearings of this subject were beautifully worked out by Dr. Laycock, some years ago, in a memoir on the Reflex Functions of the Brain, which was published in the *British and Foreign Medical Review* (vol. xix). In this memoir, Dr. Laycock discusses the hydrophobic gasp, and, after speaking of its induction by attempts to drink, traces the influence of mere idea in bringing about a like result. "The cerebral nerves", says he, "being analogous to the posterior spinal nerves, and the encephalic ganglia analogous to the spinal ganglia, the spectrum of the cup of water will traverse the optic nerves, and enter the analogue of the posterior grey matter in the brain, causing changes (ideogenous changes) corresponding to the idea of water; thence the series of excited changes will pass over to the analogue of the anterior grey matter, exciting another series (kinetic changes), by which the necessary groups of muscles are combined in action." The whole subject has also been admirably elucidated by Dr. Carpenter, in the last edition of his *Human Physiology*.

From the dominance of particular ideas, movements very often become excited when neither sensation nor emotion exerts any very appreciable influence, and when volition apparently exerts none at all. The movements in question

seem to be quite as automatic—*reflex* as it were—as those which spring from impressions made upon the spinal, sensory, or emotive ganglia. In the transition state between sleeping and waking, there is great fertility of incongruous thought—disorderly groups of ideas, receiving no governance whatever from the will; yet, in these circumstances, muscular movements and other phenomena will frequently take place, respondent purely to the dominant idea. An attractive object is before the imagination, and a snatch is made at it. Here there is no selection among motives—no will; the act is altogether impulsive, prompted by the simple idea. In certain irregular kinds of sleep, and in somnambulism, spontaneously arising or induced by artificial processes, the mind can at times be literally *played upon*, so as to educe actions and movements contrived beforehand; these being suggested by communication of the correspondent idea, which becomes reflected in the outward conduct. Mr. Braid, in his hypnotic demonstrations, exhibits these phenomena in a very remarkable manner. He tells the sleeper, or sleep-waker, that he must raise from the floor some article before him; that, however, its weight may defeat him; the subject of the experiment becomes ruled by the idea that he has to elevate some very ponderous substance; but it is a light pocket-handkerchief, probably. In such circumstances, I have seen muscular effort exerted in vain. It is intimated, in the hearing of the hypnotised person, that he has been insulted; the head becomes elevated in disdain. It is whispered that you are about to excite his benevolence, and he shows himself liberal in gifts; and so on. These things constitute illustrations of Dr. Laycock's reflex functions of the brain; and Dr. Carpenter, who appears to have worked out this matter very thoroughly, designates the phenomena *ideo-motor*.

*Ideo-dynamic* would probably constitute a phraseology more appropriate, as applicable to a wider range of phenomena.

The dynamic influence which peculiar ideas and trains of thought exert, under circumstances in which volitional agency is imperfect or altogether in abeyance, is curiously exhibited in the origin and progress of numerous mental maladies; and, in instances wherein there may be no actual insanity, the singular effects which at times result, as *ideo-dynamic* phenomena, have, in their significance, important practical relations. On these accounts, I will furnish some still more striking illustrations of the influence mentioned.

A gentleman some years ago consulted me for sleepless nights. I formed the opinion that his ailment was attributable to fault in the stomach, and prescribed for him some bitter with an antacid. I thought it advisable, however, to commence with a free action of the bowels; and, with this view, prescribed also eight grains of the compound extract of colocynth and two of calomel, made into pills, directed to be taken at bed-time. When I again saw the patient, he told me the pills had given him an excellent night, for that he had slept beautifully. "But," I said, "did they not purge you? They were intended to do so." "Why," he said, "as I had come to consult you for sleepless nights, and as the pills were to be taken at bed-time, I thought they were to make me sleep, and I did sleep; I was not purged at all." Now, instances of imaginary medicines producing the expected effect are common enough; doubtless, this is a circumstance to be considered in estimating the folios of homœopathy, and other such delusions of the hour; but here was a case in which, further, the ordinary action of powerful medicines was hindered by the dominance of an expectant idea.

The following case, having a similar significance, is quoted from Pechlin by Dr. Crichton, in his work on *Mental Derangement*, published more than half a century ago:—"There was a student of my acquaintance at Leyden, who, either because I was too young, or because he wished to save his money, did not consult me, but took care of his own health. He had probably heard medical men say that purgatives were the best kind of remedies, and that pills were the best form for giving them. As he had been told that Fernelius was an author of great reputation, he borrowed him of me. I sent it to him. He looked in the index for the word pill; and, as he imagined that all pills were purges, he took the first as the best. These were the pil. cynoglossi, the dose one scruple, which he swallowed; and, after drinking two or three glasses of warm beer, waited the effect; and lo! it took place agreeably to the imagination, and he was thus purged by opium, hyoscyamus, crocus, and other anodynes and astringents."

The influence, under some circumstances, of particular directions of thought, in determining convulsions, especially in the female constitution, is familiar to all practitioners who have to treat hysterical and other such affections. On this account, detailed examples in illustration would be superfluous. "The effect", says Romberg, "of the imagination on seeing spasmodic movements, and even the mere recollection of them, may give rise to convulsions."

It is curious to witness the absorbing effects of dominant ideas in several of the forms of insanity. Common sensation sometimes appears to be temporarily paralysed. At this time, I have a female patient under my care, who, when deeply engrossed with her maniacal wanderings, appears to be quite insensible to pain. She will inflict upon herself bodily injury, as if from pure caprice; and display



the most senseless indifference." "I have applied", says Esquirol, "blisters, setons, moxas, the actual cautery, to individuals strongly inclined to suicide, and to other melancholic patients, for the purpose of trying their sensibility: I have produced no pain; and some, after recovery, have assured me that they experienced no suffering whatever from these applications."\*

The phenomena of mesmeric and natural somnambulism exhibit a parallelism with this state of things. With idiots, in whom ideas have such little force, mesmeric effects cannot be produced. At any rate, Dr. Guggenbühl, so philanthropically distinguished for his successful efforts in the improvement of cretins, has tried mesmerism; but, within his experience, not one has even been put to sleep—a circumstance of itself suggesting that many of the phenomena of mesmerism result from the dynamism of dominant ideas.

The sudden and energetic communication of some striking thought to the mind exerts very singular effects, occasionally in suspending the power of particular muscles, and sometimes in the temporary abolition of consciousness. The Abbé Faria, celebrated in mesmeric history, is said to have put whole rows of persons into an unconscious state, through the vigour and determination with which he bade them "sleep!" A remarkable case is cited by Crichton† from the *Psychological Magazine*, a periodical publication of the last century—a case which shows the paralysing influence of an expectant thought communicated as *shock*. "In Kleische, a small village in Germany, belonging to Mr. V. T., a maid-servant of that gentleman's family was sent a short league from home, to buy some meat. She

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\* Des Maladies Mentales.

† Op. citat.



executed her orders correctly, and, as she was returning in the evening, she thought she suddenly heard a great noise behind her, like the noise of many waggons. Upon turning round, she observed a little grey man, not bigger than a child, who commanded her to go along with him. She did not, however, return any answer, but continued to walk on. The little figure accompanied her, and frequently urged her to go along with him. Upon reaching the outer gate of her master's residence, she was met by the coachman, who asked her where she had been, to which she returned a very distinct answer. He did not remark the little man, but she still continued to do so. As she was passing the bridge, he summoned her for the last time, and, upon her refusing to answer him, he told her, with a menacing look, that she should be four days blind and dumb; and having said so, he disappeared.

“The girl hastened to her apartment, and threw herself on the bed, unable to open her eyes, or to pronounce a word. She appeared to understand all that was said, but could not make any answer to the questions which were proposed to her, except by signs. Everything was tried for her recovery by the family with whom she lived, but all was in vain. She was incapable of swallowing the medicines which were ordered for her. At last, on the expiration of the fourth day, she arose in tolerably good health, and narrated what had happened to her.”

An anecdote, which illustrates the same psychological principle as that illustrated by the foregoing narrative, has been communicated to me by my friend and colleague, Dr. Whitehead, in these terms:—“The following is an account of the incident which happened to my old friend Mons. Boutibonne, and which I promised to give you in writing. Mons. B., a man of literary attainments, a native of Paris,

served in Napoleon's army, and was present at a number of engagements during the early part of the present century. At the battle of Wagram, which resulted in a treaty of peace with Austria in November 1809, Mons. B. was actively engaged during the whole of the fray, which lasted, if I rightly remember, from soon after midday until dark. The ranks around him had been terribly thinned by the enemy's shot, so that his position at sunset was nearly isolated; and, while in the act of reloading his musket, he was shot down by a cannon-ball. The impression produced upon his mind was, that the ball had passed, from left to right, through his legs below the knees, separating them from the thighs, as he suddenly sank down, shortened as he believed to the extent of about a foot in measurement; the trunk of the body falling backwards on the ground, and the senses being completely paralysed by the shock. In this posture, he lay motionless during the remainder of the night, not daring to move a muscle, for fear of fatal consequences. He experienced no severe suffering; but this immunity from pain he attributed to the stunning effect produced upon the brain and nervous system. 'My wounded companions', said he, 'lay groaning in agony on every side; but I uttered not a word, nor ventured to move, lest the torn vessels should be roused into action, and produce fatal hæmorrhage; for I had been made acquainted with the fact that blood-vessels wounded in this way did not usually bleed profusely until reaction took place. At early dawn on the following morning, I was aroused from a troubled slumber by one of the medical staff, who came round to succour the wounded. 'What's the matter with you, my good fellow?' (Fr. 'Qu'a-t-il mon camarade?') said he. 'Ah! touchez-moi doucement, je vous prie,' I replied, 'un coup de canon m'a emporté les jambes.' He proceeded at once to

examine my legs and thighs; and giving me a good shake, with a *ris de joie*, he exclaimed, 'Faites-vous lever d'abord, vous n'avez rien de mal.' Whereupon I sprung up in utter astonishment, and stood firmly on the legs which I believed had been lost to me for ever. I felt more thankful than I had ever done in the whole course of my life before. I had not a wound about me. I had indeed been shot down by an immense cannon-ball; but, instead of passing through the legs, as I firmly believed it to have done, the ball had passed under my feet, and had ploughed away a cavity in the earth beneath, at least a foot in depth, into which my feet suddenly sank, giving me the idea that I had been thus shortened by the separation of my legs. *Voilà ce que se fait-il le pouvoir d'imagination.'*"

But not only will a certain suspension of consciousness have place, and also of the energy of particular muscles, under the dynamic influence of ideas, but, moreover, in cases in which there is paralysis of function, an attentive and expectant thought will lessen for a time the morbid incompetency. I feel confident that temporary improvement in the hearing, which I have had occasion to witness, and frequently to hear of, in deaf persons subjected to mesmeric and other such unwonted processes of cure, has resulted altogether from the idea. Romberg relates the case of a patient whose leg and foot had become insensible, and in whom voluntary motion in those parts was all but abolished; he states, however, that, even in the absence of all feeling, "the movement of the toes was facilitated by directing attention to them;"\* and within a like category must rank those well known instances in which local action becomes stimulated or depraved by the bestowal of excessive and anxious attention to particular organs or structures.

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\* Op. citat.

Another and habitual effect of ideas consists in the production of variations in the *cœnæsthesis*, or general sensibility; thus giving rise to sentiment, affection, and passion. What indeed are the emotions but those states of consciousness which result from the reciprocal action of thought and sensibility? Particular ideas and sets of ideas operate upon this latter—upon the corporeal *self-feeling*—and accomplish peculiar changes therein; and the impressions so received react back again upon corresponding trains of thought. If, as I have supposed, the so called optic thalami and corpora striata constitute the encephalic centres of emotion, we must, in these processes, regard them as acted upon from above—from the hemispherical ganglia—through the conducting agency of intercommunicating white fibres; just as, in emotion from more physical states, the same centres are supposed to be acted upon from below, through nervous filaments distributed to the organs and structures very generally. This hypothesis, says the learned and able author of *A Critical History of Modern Speculative Philosophy*, “would harmonise extremely well with the whole observed development of our knowledge, which, commencing with a physical impulse, appears next in the form of an incipient mental sensibility, and then expands into distinct notions or ideas; which ideas can then, in their turn, react upon the emotions. The position of the above mentioned ganglia at the base of the hemispheres corresponds exactly with the supposed function. They lie midway between the sensory ganglia on the one side, and the cerebral hemispheres on the other; and have fibres which communicate downwards to the one and upwards to the other.”\*

The inward feelings called forth by the agency of thought

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\* Morell's “Analysis of the Intellectual Powers”.

may be pleasurable or painful; but a statement that the emotions are constituted of the pleasure or the pain resulting from ideas does not exhaust the description. The late Mr. James Mill, the Rev. Sydney Smith, and some other psychologists, however, seem to reduce the emotional states to so very simple a definition. Benevolence, in this view of the case, comes to be regarded as the pleasure experienced in contemplation of the happiness of others; and fear, again, as the pain that flows from anticipation of evil; an analysis being attainable in the same way with all the emotions—passions, affections, and sentiments, alike.

Now, I think, upon reflection, that we must admit the specifically distinct character of our varying states of consciousness, as recognised in hope, fear, grief, pride, vanity, love, and other such inward experiences. We *feel* in a characteristic manner under these several circumstances, quite irrespective of the pleasure or the pain that attends them. Fear is fear, and need not be exclusively painful or pleasurable; love is love, and is only pleasurable under appropriate conditions; grief may be a “silent luxury”, as well as a poignant suffering. The psychical states of love, hatred, desire, aversion, joy, sadness, hope, despair, fear, audacity, courage, and so on, are modifications of the emotional sensibility provoked by thought, but separable from thought; such modifications being distinguishable amongst each other, regarded simply as feeling.

My meaning will be somewhat plainer if I cite the analogies afforded by external sensation. Hot and cold, hard and soft, moist and dry, as sensations, are distinguishable conscious experiences, called forth by the qualities of objects, but in themselves subjective states, pleasurable, painful, or neutral, as the case may be. The sense of taste furnishes probably the most complete and readily seized

analogy. *Sweetness* is ordinarily pleasurable ; to some, however, it is painful ; and to others it is neither one nor the other. Occasionally, it is pleasurable, painful, and neutral, at different epochs of life ; but at all times, and under all circumstances, sweetness is sweetness.

Gustatory impressions excited by sapid particles are sources both of pleasure and pain ; they have always a distinct character about them ; and the sense of taste would be very imperfectly described, in calling it the pleasure or the pain procured by contact of the tongue with sapid substances.

In a somewhat analogous manner, I regard the emotions, in their several states of sentiment, affection, and passion, as particular conditions of the *cœnesthesis*, determined usually by the presence of correspondent ideas, but capable, to some extent, of being experienced in their absence. If a dog bark loudly and unexpectedly, I startle, and immediately experience an *emotion* of fear distinctly prior to the *idea* of danger.

Who, that has seen much of nervous and mental maladies, has not had frequent occasion to witness emotional states of all kinds, without the presence of the ideas commonly inducing them ? Hopefulness, joy, grief, and timidity, are perpetually encountered under these circumstances. "Some melancholic persons", says Esquirol, "are frightened at everything, and their life is consumed in constantly recurring anguish ; whilst others are terrified by a vague feeling which has no motive. '*I am afraid*,' say these patients, '*I am afraid*.' But of what ? '*I don't know*, but *I am afraid*.'"\*

It is within the experience of almost every one to have felt joy, sorrow, and anxiety, as the result of a dream, the

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\* Des Maladies Mentales.



ideas connected with which have entirely passed from the mind.

However speculative to many persons the physiology of the emotions here set forth may appear, it assists in the explanation of many pathological as well as physiological phenomena. When we regard the great ganglionic centres placed at the base of the hemispheres as an intermediate sensorium between purely mental states on the one side, and the consciousness of physical conditions on the other, it becomes intelligible that disordered bodily health should in most instances painfully impress the emotive sensibility; and that the influence, in ascending, as it were, should act upon the development of thought, giving rise to anxious and painful ideas. Or, to trace the process in reverse order: intelligence arrives suddenly of the death of some one beloved; the auditory ganglia, through the appropriate nerves, receive the sounds significant of the fact; the physiological change thus brought about has its influence conveyed onwards, and it attains the hemispherical ganglia; hereupon apprehension of the circumstance ensues, and the ideas developed work downwards upon the emotional centres, and violent weeping takes place as the physical expression of grief; and disorder of the alimentary canal, or even total derangement of the health, may follow as the consequence.

Particular feelings affect the bodily functions in methods suggesting varying but special relations between individual organs and the emotive centres. "Fear," says Crichton, "is apt to occasion a diarrhœa and incontinence of urine; anger affects the functions of the liver; grief disorders the stomach, and affects the lachrymal gland; sudden terror, when without hope, produces an almost complete palsy; and hope itself, when the attainment of the object is near,

affects the organs of respiration, and causes a quick and powerful distribution of blood throughout the whole body.”\*

At first sight, there may seem to be an incompatibility between readily observed cranioseopic facts and the doctrine which places the region of thought in the hemispherical ganglia at large, rather than in the anterior division exclusively. And, indeed, to those who have never had faith in the details of phrenology, some peculiar connexion of the forehead with the intellect must appear to be highly probable. If, however, we examine this matter a little more closely, it will be obvious that, to whatever extent it may be thought necessary from the state of facts to admit an organology, as proposed by Gall, such organology would be quite reconcilable with the speculations advanced in this lecture.

In any division of the mental faculties that we may adopt, be it that of the phrenologists, or that of other psychologists, we must recognise in each faculty a twofold relation, an *ideal* and an *emotional* one. I will select for the illustration three phrenological faculties, the organs of which are among those represented as best established; I will take eventuality as an “intellectual power”, veneration as a “moral sentiment”, and destructiveness as an “animal propensity”.

Now, eventuality, according to phrenological teaching, exercises itself with changing phenomena—with events; it procures the information, and reproduces it in memory. This, then, may be deemed its *ideal* function, accomplished through the organic instrumentality of vesicular neurine which invests the cerebral convolution placed behind a

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\* Op. citat.



certain portion of the frontal bone. But, pending this exercise, there is modification of the cœnæsthesia, in the feeling of curiosity, gratified, or simply excited, or provoking to action, as the case may be. And this is the *emotional* function, organically active, we will assume, in that part of the corpus striatum which is in fibrous communication with the vesicular neurine before mentioned.

As regards veneration, there are persons of a reverent and devout tendency, who show it rather in the direction of their spontaneous and instinctive thinking, as it were, than in any great amount of devotional sensibility. The ideas of some individuals are always upon antiquity, upon great men, and upon the religious objects of reverence; and that, too, in cases in which there is but little manifestation of feeling. Here we have the ideal display of veneration. At other times, we see the excesses of devotional feeling, without much thought in regard to its objects; it is almost altogether emotion. In going to the anatomy, we know that vesicular neurine is at the central summit of the brain, communicating with similar matter at the base.

✓ Destructiveness supplies a very obvious illustration of my meaning. There is cruelty as thought, and wrath as feeling; when deliberate acts of poisoning and of incendiarism are perpetrated, when defenceless and helpless creatures are gratuitously tortured, destructiveness is mainly ideal, as it certainly is cold-blooded; but when there is furious passion—when there is perturbation of the cœnæsthesia in deeds of violence—it is emotion. Anatomy, of course, gives the same explanation as in the previous illustrations.

But phrenologists commonly assume that, apart from the intellect, the faculties each resolve themselves into kinds of feeling, passive in complacency and in dissatisfaction, and active in impulse; the share which ideas have in their pre-

cise manifestations, being attributed to co-operation of the intellect.

Now, it is certain that ordinary thinking goes on spontaneously very much; that there is an evolution of ideas habitually in play, which has very appropriately been designated the mind's automatic working. It has been so designated because, in these circumstances, there is no volitional co-ordination of thought, as in direct and active employment of the intelligence. This mental attribute has been denominated *imagination*, not as signifying the imagination exclusively which is poetic or inventive, but as that which constitutes the internal spring of all psychical imagery—of things imaged to the mind. Gall himself recognises this general faculty of the mind in the following passages:—

“I call imagination the action of every faculty whatever that has place independently of the external world. The imagination is the creative power of each fundamental faculty. The imagination of the sense of places creates landscapes. The imagination of the sense of tones creates music. The imagination of the sense of numbers creates problems. The mechanical imagination creates machines.

“This explains how the same man may have a prompt and sure judgment relative to some subjects, and be almost imbecile in regard to others; how he may have a most lively and fertile imagination for certain matters, and be frozen and sterile for others.”\*

But, lastly, what is to be said of the will—that attribute of humanity which supplies the basis of moral responsibility, and the weakening or destruction of which constitutes so important a feature in psychological pathology? Certainly,

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\* Sur les Fonctions du Cerveau.

the will can be regarded neither as a faculty apart from other states of mind, nor as mixed up particularly with any distinct and special ganglionic structure. In any concise account of it, I deem it impossible to surpass the definition of Mr. Morell: "An act of the will", says this eminent metaphysician, "embodies the effort of the whole man, implying, at the same time, intelligence, feeling, and force; physiologically speaking, this state of mind will stand in correlation with the total affection of the nervous system. . . . We regard it as an expression of the totality of our organic power, the whole governing the parts, and directing to the fulfilment of one purpose."\*

According to the account, then, which I have given of the vital operations, in the fulfilment of which the brain and nervous system mainly participate, reflex movements without consciousness issue from the grey matter of the spinal cord, and from the sympathetic ganglia; consensual actions flow from the distributive influence of the sensory ganglia; ideodynamic phenomena result, primarily, from limited action of the hemispherical ganglia; and those which are purely emotional come probably from the optic thalami and corpora striata. Voluntary acts proceed from the MAN.

I must allow—what, indeed, has already been conceded—that in what I have advanced there is a great deal of speculation. I submit, however, that in any attempted correlation of psychology with physiology, it is impossible, in the present state of knowledge, to avoid it; and, further, that for the attainment of clear and connected views of psychological medicine, it is good and useful to construct rational hypotheses, in default of established and valid theories.

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\* Op. citat.

Hypotheses, of course, must not have their value or their office mis-estimated; they cannot rightly form a rest, like an axiom; he who employs them must always be ready to modify or to give them up, when additional evidence appears to demand some such proceeding. Meanwhile, they serve to "colligate facts", and to fix the attention more searchingly upon phenomena. "There is a period in knowledge", says Crichton, "when hypotheses must be indulged in, if we mean to make any progress. It is that period when the facts are too numerous to be recollected without general principles, and yet where the facts are too few to constitute a valid theory."\*

I would guard such of my hearers as are inexperienced in discussions of this kind, against the impression that science shows the soul, the conscious principle within us, to be susceptible of any true, actual division. If there be one characteristic which more than another distinguishes the conscious EGO from mere body, it is, I conceive, its absolute unity. Have we not the same assurance from pure consciousness, that the *me* which thinks is not composed of parts, as we have from sense-consciousness that matter is an aggregate of atoms?

Distinctness in the organic instruments implies no corresponding divisibility in the conscious principle which they subserve. To give expression upon this occasion to the abstract views which I entertain myself upon this subject, I would say that, in all psychical phenomena, the whole mind acts. Mental faculties are *states* of consciousness—phases only of the one undivided and indivisible mind. It is the whole mind which hears and sees; it is the same entire mind which receives ideas, and recalls them in me-

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\* Op. citat.

mory; it is the one thinking entity that loves, fears, and hopes; it is still the same unity, the soul, that performs the highest intellectual operations, in abstracting, combining ideas, reasoning, and judging. Finally, and comprehensively, it is the immaterial spirit which takes cognisance of itself, which controls its own states, and which WILLS.



